EFFECTIVE MATHEMATICS EDUCATION RESEARCH GRANTS

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Institute of Education Sciences
http://www.ed.gov/offices/IES/funding.html

LETTER OF INTENT RECEIPT DATE: March 6, 2003

APPLICATION RECEIPT DATE: April 18, 2003

THIS REQUEST FOR APPLICATIONS CONTAINS THE FOLLOWING INFORMATION:

<u>Request for Applications</u>

The Institute of Education Sciences invites applications for research projects that will contribute to its research program on Effective Mathematics Education. For this competition, the Institute will consider only applications that meet the requirements outlined below under the section on Requirements of the Proposed Research.

Purpose of the Research Program

The purpose of the research program on Effective Mathematics Education is to support the identification of interventions and approaches in mathematics education that will result in improving mathematics achievement for all students and closing achievement gaps between minority and non-minority students, and between economically disadvantaged students and their more advantaged peers. The focus of the 2003 competition will be middle-school mathematics education.

Background

Education, science, and technology policy in the United States has included a concern about the mathematics achievement of our nation's youth since the aftermath of the Soviet Union's launching of Sputnik in 1957. While there is some evidence of gains in achievement over the past 30 years, large numbers of U.S. students show mastery of only rudimentary mathematics skills and only a small proportion achieve at high levels. In the most recent National Assessment of Educational Progress (NAEP), only 27 percent of grade 8 students and 17 percent of grade 12 students were judged "proficient" in mathematics, while over a third of grade 8 and grade 12 students scored below the "basic" level. Students who score below the basic level do not demonstrate even partial mastery of the material that is appropriate for their age group. Low levels of achievement are more likely among minority groups and children from low-income backgrounds. For the past decade, the gap in NAEP mathematics scores between white and black students and between white and Hispanic students has remained large and unchanged.

International comparisons indicate that mathematics education in the United States declines substantially in effectiveness between elementary school and high school. For example, in the Third International Mathematics and Science Study (TIMSS), conducted in 1995 and involving 41 countries, American fourth graders scored above the international average in mathematics, and were outperformed by only 7 countries. In contrast, eighth graders performed below the international average and were outperformed by children in 27 countries. By twelfth grade, U.S. students scored among the lowest of the participating countries, outperforming only two nations.

While levels of achievement in mathematics among U.S. students are low, the demand for a mathematically proficient workforce is increasing. The United States cannot fill all the jobs in mathematically intensive fields with qualified U.S. citizens. As a result, Congress has been forced in recent years to provide an expanded pool of visas for foreign nationals with high-tech skills. At the same time, the number of college degrees awarded in technical areas has dropped sharply for United States citizens.

The poor performance of students in the middle grades, as reflected in eighth grade NAEP and TIMSS scores, is of particular concern as math instruction during these years provides the foundation for success in algebra. Algebra is foundational in all areas of mathematics because it provides tools for representing and analyzing quantitative relationships, for solving problems, and for stating and proving generalizations. Without proficiency in algebra, students will be unlikely to master other mathematical subjects. This leads, in turn, to poor preparation for college entry, and closes off options for careers in mathematically intensive fields. Failure to learn the mathematics that is prerequisite for success in algebra is widespread and occurs disproportionately among children from minority groups and low-income households. Reflecting a political consensus that all children should be well educated in mathematics, the federal No Child Left Behind Act of 2001 requires that states ensure that all groups of students within public schools reach proficiency in mathematics within 12 years. Annual assessments in mathematics are required in grades 3 through 8 to measure progress towards that goal. Schools receiving federal funds under the No Child Left Behind Act are enjoined to improve achievement using approaches that are grounded in scientifically based research.

The 1990s saw efforts to reform mathematics education in order to improve students' performance and to narrow achievement gaps. Reform efforts in pedagogy were, in general, based on cognitive theories that children learn best when they construct their own knowledge through solving problems that engage their natural curiosity and that provide opportunities for each child's underlying misconceptions about mathematics to be exposed. Mathematical problems and examples were drawn from real-life situations and designed so that children could discover underlying mathematical principles in the process of working out their own solutions. These student-directed activities, sometimes called discovery learning, took precedence over direct instruction by teachers.

In addition to these pedagogical shifts, reform approaches redefined standards for mathematics content and performance. The definition of mathematical proficiency was broadened from the ability to perform the computations necessary to solve math problems, to the ability to understand mathematical concepts, to apply mathematics to novel problems, and to reason mathematically. Broadly speaking, reformers focused on the development of conceptual understanding of mathematics and lessened the emphasis on fluent mastery of mathematical facts and procedures. Reports, recommendations, and standards from such respected sources as the National Council of Teachers of Mathematics and the National Research Council indicated that instruction should address all strands of proficiency simultaneously, and rejected the "old ways" of teaching math, such as mastering computational procedures followed by problem solving.

Critics of the 1990s math reforms charged that in shifting the focus from computation to understanding, from teacher-directed to student-directed learning, and from a hierarchy of skills to simultaneous instruction in all strands of mathematical competence, reformers generated a recipe for poor preparation of students for mathematically challenging content. The critics argue that the 1990s math reforms ignore the importance of fundamental building blocks, are not sufficiently rigorous, do not cover aspects of math content that are necessary for proficiency, and over-generalize the role of curiosity and discovery as core principles of mathematics learning.

The "math wars" cannot be resolved on the basis of existing research, though each side draws from empirical observations in support of its position. For example, proponents of the 1990s reforms point to Japan as a nation that most clearly embodies the reform principle of focusing on conceptual understanding at all levels of mathematics education. They note that in the TIMSS, Japan was among the highest scoring nations and outperformed the U.S. at each grade level. Critics counter that Japan differs from the U.S. on many dimensions of mathematics education other than the focus on conceptual understanding. For instance, the curriculum content in Japan involves substantially more computational complexity than in the U.S. Further, U.S. math curricula through middle school tend to cover many more topics in much less depth and with less integration across the school years than curricula employed in Japan and other countries. These dimensions, which may be important, are not part of the reform agenda. Further, note the critics, Japan does not differ significantly in achievement from other nations whose classroom practices differ substantially from Japan's and are similar to those in the U.S. on dimensions such as the degree to which conceptual connections are stressed. Japanese students and their families also differ substantially from U.S. students and their families in beliefs about the role of hard work in academic success. For these and other reasons, it is impossible to generate anything stronger than hypotheses about how national differences in mathematics education contribute to national differences in mathematics achievement.

Likewise, observations about the performance of individual states in connection with their commitment to reform approaches are ambiguous. For example, California embraced the new math reforms in the late 1980s through 1998, at which point a new set of more rigorous content standards was adopted. California was near to last among all states in math achievement on the NAEP during the period in which the reform approach was in place. However, advocates of the math reforms argue that the implementation of the reform standards during the 1990s was weak statewide in California, and that appreciable student progress was found in classrooms and districts in which teachers were trained to understand and deliver instruction consistent with the reform standards.

There are several other areas of research where one can look for evidence to support one or the other side of the math debates, but each has serious drawbacks with respect to the quality and relevance of the data for deciding competing claims about what mathematics children should learn, when they should learn it, and how they should be taught. These are important issues that need to be addressed with research. Goal 1 of the program of Research on Effective Mathematics Education is to do so.

At the same time, it is important to understand that the study of curriculum and pedagogy does not exhaust the domain of important variables that need to be better understood through research if high levels of mathematics achievement are to be obtained for all children. There are both logical and empirical reasons to believe that substantial and sustained improvement in math achievement requires attention to school and district level variables that provide the support for effective classroom practice in mathematics. At the broadest level this raises questions about how to achieve alignment among mathematics content standards, performance standards, accountability systems, curriculum, teaching materials, assessment, classroom practice, and the preparation and professional development of mathematics teachers.

Differences in mathematics achievement among schools and districts serving students of similar economic and racial/ethnic backgrounds are likely to reflect, in part, differences in the alignment of components of policy and practice. When these differences occur within states where every school is operating under the same state standards and accountability system, they point to the important role of organizational and management variables at the local level in enhancing student learning. Within the last few years several on-line databases have emerged that allow schools within states to be compared in terms of student performance on state assessments. One such database, which has performance data for individual schools in nearly every state, was developed by the American Institutes of Research under contract to the U.S. Department of Education. It can be accessed through the website of the Education Trust. Analyses using that database disclose large numbers of schools across the nation that are high in poverty and minority enrollment but also high in mathematics achievement. In many cases, these schools are serving the same demographic population as schools within the same state that are not succeeding.

Various after-the-fact accounts of the distinctive features of high-flying, beat-the-odds schools and districts are available in the literature. For example, a recent report, *Foundations for Success*, by MDRC for the Council of the Great City Schools, compared urban districts that had managed to increase student performance in mathematics and reading with comparison districts that had not. The successful districts were reported to have specific achievement goals, on a set schedule with defined consequences; to have a common curriculum for all schools that was aligned with state standards; and to have translated these standards into instructional practice. They gave early and ongoing assessment data to teachers and principals as well as trained and supported them as the data were used to diagnose teacher and student weaknesses and make improvements. In contrast, the comparison districts gave schools multiple and conflicting curricula and instructional expectations, which they were left to decipher and implement on their own.

Evidence that schools and districts can succeed despite the challenges of educating children from minority and poverty backgrounds dispels the myth that the task is impossible. As inspirational and encouraging as such demonstrations may be, high-flying, high poverty schools are still rare and there are no empirically proven principles and procedures for replicating them. The second goal of the program of Research on Effective Mathematics Education is to support research that will identify the principles and procedures for replicating schools and districts that are relatively successful in enhancing mathematical achievement for all students.

It might appear that the presence of high poverty, high minority schools that do relatively well on state assessments of mathematics obviates the need for research on curriculum and instruction identified previously as the first goal of this program of Research on Effective Mathematics Education. If there are schools that are already succeeding against the odds, doesn't that indicate that effective curriculum and pedagogy already exist? Not necessarily. Given the overall low level of mathematics achievement in the U.S. compared to many other industrialized nations, a school or district can do relatively well compared to other schools or districts and still fall far short of the goal of achieving mathematical proficiency for all students. In this context, Goal 1, focused on the development and evaluation of more effective curriculum and instruction, can be thought of as the design phase for a new generation of approaches to mathematics education. Goal 2, focused on learning how to successfully replicate effective schools and districts, is intended to provide wider implementation of current best practice and to discover approaches to replication that could be applied to new generations of curricula and pedagogy.

In summary, because low achievement in math by U.S. students starting in the middle grades has serious consequences for students and the nation, and because the No Child Left Behind Act requires that states and localities use research proven practices in educating all children, it is critically important for the Institute of Education Sciences to fund research that will answer questions that are central to improving the effectiveness of mathematics education. Such research is largely lacking for mathematics education in middle school. Development and identification of more effective interventions and approaches in mathematics education, and understanding how to replicate the best of current practice, will result in improved mathematics achievement for all middle school students. The Institute of Education Sciences launches the Research on Effective Mathematics Education (REME) program to accumulate scientific evidence on interventions, approaches, and systems that support the development of mathematical proficiency by all students.

Requirements of the Proposed Research

The program of Research on Effective Mathematics Education supports research that focuses on the improvement of mathematical competence in grades 5 through 8, with an emphasis on the skills and knowledge that provide the basis for success in algebra (e.g. fractions, ratio and proportion, the concept of a variable, equivalent expressions, linear equations and relationships, functions, relationships between arithmetic operations). The focus of REME is approaches and practices that play out over the course of one or more school years, that involve multiple classrooms and teachers, and that are likely to have an impact on an array of mathematical skills such as those tested on nationally normed standardized assessments and state assessments used for accountability purposes. Studies of instruction in very specific topic areas in mathematics and covering a short time-frame are not appropriate for REME. Investigators interested in conducting fine-grained studies of particular processes in mathematics teaching and learning should refer to the IES research grant program in Cognition and Student Learning. Investigators whose principal interest lies in the area of teacher characteristics, training, professional development, and support should consult the IES research program in Teacher Quality.

Research funded under the Research on Effective Mathematics Education program must target at least one of the two following goals:

Goal 1: Evaluating Effective Curriculum and Instruction. Identify and evaluate approaches to instruction and curricula in the middle grades with a focus on approaches that provide the best support for a successful transition to algebra. One area of interest is studies that examine the effects of curricula that have more depth and less breadth compared with the broader curricula that are more typical of U.S. practice. More focused curricula could be obtained by the adaptation and implementation of materials that have been used successfully by other nations, or through selective use and sequencing of materials that are currently available in the U.S. market. Another area of interest is research that explores the effects of different pedagogical approaches to instruction (e.g., teacher directed versus student directed activities, or project-based versus practice-based, or group-based versus individual), or that examines the effects of different sequences of instruction (e.g., simultaneous instruction in foundational skills, reasoning, and application versus instruction that stresses fluency in foundational skills before the introduction of more conceptual tasks). Research that examines the effects of teachers' use of real life problems versus problems that involve only mathematical language and symbols in classroom lessons is also of interest, as is research that examines the role of assessment systems that provide regular and ongoing feedback to teachers and students on progress towards instructional objectives.

Descriptions of these areas of interest are intended to exemplify types of research that might be desirable. They are not intended to exhaust the list of researchable questions under REME or to suggest that research proposals addressing questions unlike those exemplified would be reviewed unfavorably. Any question that bears on the design of curriculum and instruction at a level that may be important to raising middle school math achievement nationally and reducing achievement gaps is appropriate.

In addition to the primary research question regarding effective curriculum and instruction, investigators are expected to explore secondary research questions that will provide insight into what makes an approach effective, for whom, and under what circumstances. Applicants may propose to investigate secondary questions in one or more of the topic areas identified below. The topics of particular interest for a secondary focus include:

1) <u>Individual differences among students</u>: Does the intervention need to be modified to support students with weak preparation in mathematics and in what ways? Do differences in students' ability and motivation lead to different outcomes and how should this be addressed? Does the intervention produce a different impact depending on a student's ethnicity, race, social class, or gender, and how can the intervention be modified to ensure its effectiveness across groups?
2) <u>Teacher characteristics and knowledge</u>: Does a teacher's knowledge of mathematics content influence how well he or she implements the intervention and does this result in different levels of effectiveness? How do teachers' beliefs about the nature of mathematics and how it should be taught influence how they implement instruction, curricula and assessments?
3) <u>Support for teachers</u>: What kinds of professional development do teachers need to make the intervention most effective? How does the lay-out and content of the instructional or curriculum materials influence how teachers

use them and how does this impact effectiveness of the intervention? Can the use of mathematics specialists or mentors improve the effectiveness of an intervention? How do planning time and opportunities for collaboration influence how well teachers implement the intervention and consequently its effectiveness?

Goal 2: Replicating Successful Schools and Districts. Identify schools or districts that are succeeding in mathematics with children from minority and low-income backgrounds and determine how the approaches used in these schools and districts can be replicated in low-performing schools. The principal area of interest is the design and evaluation of models for replicating schools and districts that are successful in producing high mathematics achievement for all students. Such studies might address the questions: What would be the effect of having teachers or administrators from low-performing schools or districts serve apprenticeships at high-performing schools before returning to their own campuses to replicate the practices of the better performing schools? How would such experiences have to be structured to provide maximal possibilities for learning during the apprenticeship and for influence upon returning to the low-performing school? Alternatively, can effective practices for supporting students' mathematics achievement be replicated through short-term visitation by teams from high-performing schools? Where should the replication effort be focused, at the administrative level or at the classroom level? If at the administrative level, should the focus be in central administration or at the building level?

Again, examples of research questions and areas of interest are not intended to be exhaustive. Many other questions and approaches related to the replication of successful schools and districts could be profitably examined.

Applicants in curriculum and instruction or school and district replication must propose approaches that are intended to have an educationally significant impact on students' readiness for algebra, and performance in algebra (in school systems in which algebra is required in grade 9 or earlier). Students may be followed into the 9th grade year or into an algebra course in order to document success in algebra; however, the intervention should be targeted at grades 5-8. Applicants may use longitudinal or cross-sectional designs as appropriate to the question and design logic. Applicants who propose significant development work prior to assessing the effects of an intervention or approach may devote up to two years of their grant period to the development and piloting of interventions and measures. Applicants with fully developed interventions that are ready to implement in Year 1 may do so. All applicants are expected to propose at least two years of full-scale implementation and evaluation of their intervention or approach, with sufficient sample size to detect educationally significant effects. Applicants must specify in detail what activities will be conducted in each year of their grants.

It is crucial that reforms in mathematics education produce improvements in knowledge and skills that can be measured, at least in part, with traditional accountability systems. Hence, IES recommends that at least one standardized measure that is not researcher developed be included among the measures used to assess mathematics performance.

Preference is given to measures used by the state or districts in which the research is being conducted. Inclusion of multiple performance measures in order to allow documentation of different aspects of mathematics proficiency such as computational skill, mastery of standard algorithms, conceptual understanding, and the ability to apply mathematical knowledge to real-world situations is encouraged.

Recipients of grants will become members of the REME consortium, which will meet twice yearly in the Washington D.C. area. Among the tasks of the consortium will be the identification of measures of students' performance in pre-algebra and algebra, which will be used to the extent practicable in at least the final year of implementation in all studies. The goal of the consortium is to arrive at some consensus about the key outcomes that must be measured to document proficiency in pre-algebra and algebra and to identify or develop common measures to assess this proficiency across projects. These measures will be used in addition to whatever project specific measures the researchers plan to use. Applicants should include funds for administering the common measures in at least one of the final two years of their intervention. IES estimates that administration of the common measures will take no more than one class period (50 minutes). Consortium members will also explore possibilities for other common measures and cross-cutting analyses.

Because REME focuses on identifying the causal effects of different approaches to curriculum and instruction, and the causal effects of different procedures for replicating successful systems, experimental designs using random assignment are strongly preferred. Applicants proposing to use other approaches, such as quasi-experiments with matched groups and statistical controls, or interrupted time series designs, should carefully justify their approach in terms of the ability to make causal inferences, and should provide a compelling rationale for why random assignment is impossible or inappropriate. For random assignment designs, the level of random assignment chosen (school, classroom, or student) must be appropriate to the scope of the intervention. For example, a study with a primary research question focused on the effectiveness of a curriculum and a secondary question focused on how common planning time for teachers influences curriculum effectiveness will most likely carry out random assignment at the school level. A study with a primary focus on effectiveness of classroom assessments that employ technology with a secondary focus on individual differences among students might carry out random assignment at the classroom or student level.

The research must be carried out in school (or other education delivery) settings. Applicants must develop relationships with schools that will support the proposed research, and document that relationship in a detailed letter of support from the education organization(s).

In the application, the applicant must:

1) Provide theoretical and empirical evidence to support the potential effectiveness of the intervention or approach, with particular reference to student achievement in pre-algebra and algebra;
2) Provide clear and complete descriptions of each of the conditions;

3) Explain procedures for assignment of participants to conditions and discuss procedures for tracking fidelity to the assignment and potential sources of contamination;
4) Explain the logic of sampling so as to capture, to the degree possible, diversity in the school population to be studied. Core variables an applicant should consider for capturing diversity include: race or ethnicity status; gender; language status; parental education, household income. Applicants are encouraged to include substantial numbers of students who typically show low levels of mathematics proficiency, or who have limited access to challenging and high quality mathematics instruction and coursework;
5) Discuss possible variations in the structure of the participating schools (public or private; a building housing grades 6-8 or grades 7-9; etc.) and how these will be taken into consideration in the evaluation design; and
6) Describe how implementation of the intervention in the school and classroom will be documented.

Applications Available

Application forms and instructions for the electronic submission of applications will be available for this program of research no later than February 21, 2003, from the following web site:

http://ies.asciences.com

Mechanism of Support

The Institute intends to award grants for periods up to 48 months pursuant to this request for applications.

Funding Available

The Institute may award up to 15 or more grants as a result of this competition and expects that the typical award will be approximately $350,000 per year for 4 years. Funding levels could be substantially higher for grants involving larger samples and experimental examination of the effects of variations in implementation. Although the plans of the Institute include this program of research, awards pursuant to this request for applications are contingent upon the availability of funds and the receipt of a sufficient number of meritorious applications.

Eligible Applicants

Applicants that have the ability and capacity to conduct scientifically valid research are eligible to apply. Eligible applicants include, but are not limited to, non-profit and for-profit organizations and public and private agencies and institutions, such as colleges and universities.

Special Requirements

Applicants should budget for two meetings each year in Washington, DC, with other grantees and Institute staff. At least one project representative should attend each two-day meeting.

Letter of Intent

A letter indicating a potential applicant's intent to submit an application is optional, but encouraged, for each application. The letter of intent is to be sent by the date listed at the beginning of this document and should indicate -- in the email subject line -- the title of the program of research covered by this request for applications and the number of the request. The title and number of this request for applications are also specified at the beginning of this document. Receipt of the letter of intent will be acknowledged by email.

The letter of intent should not exceed one page in length and should include a descriptive title and brief description of the research project; the name, institutional affiliation, address, telephone number and email address of the principal investigator(s); and the name and institutional affiliation of any key collaborators. The letter of intent should indicate the duration of the proposed project and provide an estimated budget request by year, and a total budget request. Although the letter of intent is optional, is not binding, and does not enter into the review of subsequent applications, the information that it contains allows Institute staff to estimate the potential workload to plan the review. The letter of intent should be submitted by email to:

IES-LOI@asciences.com

Submitting an Application

Applications must be submitted electronically by the application receipt date, using the ED standard forms and the instructions provided at the following web site:

http://ies.asciences.com

Potential applicants should check this site as soon as possible after February 21, 2003, when application forms and instructions first become available, for information about the electronic submission procedures that must be followed and the software that will be required.

The application form approved for this program is OMB Number 1890-0009.

Contents and Page Limits of Application

The application must include the following sections: (1) title page form (ED 424); (2) budget summary form (ED 524); (3) one-page abstract; (4) research narrative; (5) references; (6) curriculum vitae for principal investigators(s) and other key personnel (limited to 3 pages each and including only information sufficient to demonstrate that personnel possess training and expertise commensurate with their duties); (7) narrative budget justification; and (8) appendix.

The one-page *abstract* must include: The title of the project and brief descriptions of (1) the purpose of the project or the educational problem that will be addressed; (2) the population(s) from which the participants of the study(ies) will be sampled (age groups, race/ethnicity, SES); (3) the proposed research method(s); and (4) the proposed intervention if one has been proposed.

Incorporating the requirements outlined under the section on Requirements of the Proposed Research, the *research narrative* provides the majority of the information on which reviewers will evaluate the proposal and should address:

(a) Significance of the Project
- (1) Identify the educational problem that will be addressed by the study and describe the contribution the study will make to a solution to that problem.

(b) Approach
- (1) Provide a theoretical framework and review relevant prior empirical evidence supporting the proposed project, including a description of the intervention along with the conceptual rationale and empirical evidence supporting the intervention;
- (2) Include clear, concise hypotheses or research questions;
- (3) Present a clear description of, and a rationale for, the sample or study participants, including justification for exclusion and inclusion criteria and, where groups or conditions are involved, strategies for assigning participants to groups;
- (4) Provide clear descriptions of, and rationales for, data collection procedures and measures to be used; and
- (5) Present a detailed data analysis plan that justifies and explains the selected analytic strategy, shows clearly how the measures and analyses relate to the hypotheses or research questions, and indicates how the results will be interpreted. Quantitative studies should, where sufficient information is available, include a power analysis to provide some assurance that the sample is of sufficient size.

(c) Personnel
- (1) Include brief descriptions of the qualifications of key personnel (information on personnel should also be provided in their curriculum vitae).

(d) Resources
- (1) Provide a description of the resources available to support the project at the applicant's institution and in the field settings in which the research will be conducted.

The research narrative (text plus all figures, charts, tables, and diagrams) is limited to the equivalent of 25 pages, where a "page" is 8.5 in. x 11 in., on one side only, with 1 inch margins at the top, bottom, and both sides. Double space (no more than 3 lines per vertical inch) all text in the research narrative. Use a font that is either 12-point or larger, or no smaller than 10 pitch (i.e., 10 characters per inch).

The 25-page limit does not apply to the title page form, the one-page abstract, the budget summary form and narrative budget justification, the curriculum vitae, references, or the assurances and certifications.

Reviewers are able to conduct the highest quality review when applications are concise and easy to read, with pages numbered consecutively.

The *budget justification* must provide sufficient detail to allow reviewers to judge whether reasonable costs have been attributed to the project. It must include the time commitments and brief descriptions of the responsibilities of key personnel.

The *appendix* must include letters of agreement from all partners (e.g., schools) and consultants. Each letter should include enough information to make it clear that the author of the letter understands the nature of the commitment of time, space, and resources to the research project that will be required if the application is funded. The appendix is limited to 15 pages.

Application Processing

Applications must be received by 11:59 p.m. Eastern time on the application receipt dated listed in the heading of this request for applications. Upon receipt, each application will be reviewed for completeness and for responsiveness to this request for applications. Incomplete applications and applications that do not address specific requirements of this request will be returned to the applicants without further consideration.

Peer Review Process

Applications that are complete and responsive to this request will be evaluated for scientific and technical merit. Reviews will be conducted in accordance with the review criteria stated below.

Each application will be assigned to at least two primary reviewers who will complete written evaluations of the application, identifying strengths and weaknesses related to each of the review criteria. Primary reviewers will independently assign a score for each criterion, as well as an overall score, for each application they review. Based on the overall scores assigned by primary reviewers, an average overall score for each application will be calculated and a preliminary rank order of applications prepared before the full peer review panel convenes to complete the review of applications.

The 30 applications deemed to have the highest merit, as reflected by the preliminary rank order, will be reviewed by a full panel of approximately 20 individuals who have substantive and methodological expertise appropriate to the program of research and request for applications, and who served as primary reviewers for individual applications. An individual reviewer may propose to the full panel that a particular application that does not score among the top 30 in the preliminary scoring but which the reviewer believes merits consideration should also be reviewed. The panel will decide whether to review any such application.

All members of the peer review panel will be expected to review the 30 applications being considered by the panel. Following presentations by the primary reviewers and discussion by the full panel, each member of the peer review panel will score each application, assigning a score for each criterion, as well as an overall score. In addition, reviewers will indicate whether or not an application is recommended for funding.

Review Criteria

The goal of Institute-supported research is to contribute to the solution of educational problems and to provide reliable information about the educational practices that support learning and improve academic achievement and access to educational opportunities for all students. Reviewers will be expected to assess the following aspects of an application in order to judge the likelihood that the proposed research will have a substantial impact on the pursuit of that goal. Information pertinent to each of these criteria is also described above in the section on Requirements of the Proposed Research and in the description of the research narrative, which appears in the section on Contents and Page Limits of Application.

- Significance (importance of the addressed problem, contribution of the project to solution of the problem)
- Approach (conceptual rationale, hypotheses or research questions, measures, research design, analytic methods)
- Personnel (qualifications of project staff)
- Resources (support at applicant's institution and at field settings)

Strong applications for Effective Mathematics Education Research Grants clearly address each of the review criteria. They make a well-reasoned and compelling case for the significance of the project and the problems or issues that will be the subject of the proposed research. They present a research design (approach) that is complete and clearly delineated, and that incorporates sound research methods. In addition, the personnel descriptions included in strong applications make it apparent that the project director, principal investigator, and other key personnel possess training and experience commensurate with their duties. Descriptions of facilities, equipment, supplies, and other resources demonstrate that they are adequate to support the proposed activities. Commitments of each partner show support for the implementation and success of the project.

Receipt and Review Schedule

Letter of Intent Receipt Date: March 6, 2003
Application Receipt Date: April 18, 2003
Peer Review Date: June 26-27, 2003
Earliest Anticipated Start Date: August 1, 2003

Award Decisions

The following will be considered in making award decisions:

- Scientific merit as determined by the peer review
- Responsiveness to the requirements of this request
- Performance and use of funds under a previous Federal award
- Contribution to the overall program of research described in this request
- Availability of funds

Direct your questions to:

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PROGRAM AUTHORITY: 20 u.s.c. 9501 et seq., the "Education Sciences Reform Act of 2002," Title I of Public Law 107-279, November 5, 2002. This program is not subject to the intergovernmental review requirements of Executive Order 12372.

APPLICABLE REGULATIONS: The Education Department General Administrative Regulations (EDGAR) in 34 CFR parts 74, 77, 80, 81, 82, 85, 86 (part 86 applies only to Institutions of Higher Education), 97, 98, and 99. In addition, 34 CFR part 75 is applicable, except for the provisions in 34 CFR 75.102, 75.105, 75.109(a), 75.200, 75.201, 75.209, 75.210, 75.217, 75.219, 75.220, and 75.230.